



Attorney Docket No. SAMJ-098  
PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BOX PATENT APPLICATION  
Assistant Commissioner for Patents  
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Han Ju Yu, et al.

For (title): MOVING PICTURE EXPERTS  
GROUP DECODING APPARATUS  
AND METHOD FOR CAPTION  
DISPLAY

1. **Type of Application** This new application is for a(n)

- Original (nonprovisional)
- Design
  - Plant
  - Divisional.
  - Continuation.
  - Continuation-in-part (C-I-P).

2. **Benefit of Prior Application(s)**

- The new application being transmitted claims the benefit of prior Korean application(s) no. 99-3221. See item 7 .

3. **Papers Enclosed**

8 Pages of specification

2 Pages of claims

1 Page of Abstract

4 Sheets of drawings

formal

informal

       Page of Cover Sheet

- The **enclosed** drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. 1.84(b).

<b>CERTIFICATE OF MAILING</b> 37 C.F.R. § 1.10	
<p>"Express Mail" Mailing Label Number <u>EL537136901US</u> I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to BOX PATENT APPLICATION, Assistant Commissioner for Patents, Washington, DC 20231.</p>	
Date:	<u>1-18-00</u>
<u>Amy Lockhart</u>	
Amy Lockhart	
Print Name	

**4. Additional papers enclosed**

- Preliminary Amendment
- Information Disclosure Statement (37 C.F.R. 1.98)
- Form PTO-1449 (PTO/SB/08A and 08B)
- Copies of cited references
- Declaration of Biological Deposit
- Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- Special Comments
- Other: Return Postcard.

**5. Declaration or oath**

- Enclosed
  - Unexecuted
  - Executed by
    - inventors
    - legal representative of inventor(s).  
37 CFR 1.42 or 1.43.
    - joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.
    - This is the petition required by 37 CFR 1.47 and the statement required by 37 CFR 1.47 is also attached. See item 12 below for fee.
- Not Enclosed
- Application is made by a person authorized under 37 C.F.R. 1.41 (c) on behalf of all the above named inventor(s).
  - Showing that the filing is authorized.

**6. Assignment**

- An assignment of the invention to Samsung Electronics Co., Ltd.
- is attached. A separate  "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or  FORM PTO 1595 is also attached.
- will follow.

**7. Certified Copy**

Certified copy(ies) of application(s)

Korea	99-3221	01 February 1999
Country	Appln. no.	Filed
Country	Appln. no.	Filed
Country	Appln. no.	Filed

from which priority is claimed

- is (are) attached.
  - will follow.

#### **8. Fee Calculation (37 C.F.R. 1.16)**

CLAIMS AS FILED				
	Number filed	Number Extra	Rate	Basic Fee 37 C.F.R. 1.16(a) <u>\$690.00</u>
Total				
Claims (37 CFR 1.16(c))	4	- 20 =	0	\$ 18.00
Independent				
Claims (37 CFR 1.16(b))	2	- 3 =	0	\$ 78.00
Multiple dependent claim(s), if any (37 CFR 1.16(d))			+	\$260.00

- Amendment cancelling extra claims is enclosed.
  - Amendment deleting multiple-dependencies is enclosed.
  - Fee for extra claims is not being paid at this time.

Filing Fee Calculation \$ 690.00

#### **9. Small Entity Statement(s)**

- Verified Statement(s) that this is a filing by a small entity under 37 CFR 1.9 and 1.27 is (are) attached.

Status as a small entity was claimed in prior application \_\_\_\_\_, filed on \_\_\_\_\_ from which benefit is being claimed for this application under:

35 U.S.C.     119(e),  
              120,  
              121,  
              365(c),

and which status as a small entity is still proper and desired.

- A copy of the verified statement in the prior application is included

**Filing Fee Calculation (50% of A, B or C above)**

59

**10. Fee Payment Being Made at This Time**

- Not Enclosed

No filing fee is to be paid at this time.  
*(This and the surcharge required by 37 C.F.R. 1.16(e) can be paid subsequently.)*

Enclosed

Basic filing fee \$ 690.00

Recording assignment  
(\$40.00; 37 C.F.R. 1.21(h))  
(See attached "COVER SHEET FOR ASSIGNMENT ACCOMPANYING NEW APPLICATION") \$ 40.00

**Total fees enclosed** \$ 730.00

## **11. Method of Payment of Fees**

- Checks in the amounts of \$ 690.00, 40.00

Charge Account No. 19-0079 in the amount of \$ \_\_\_\_\_  
A duplicate of this transmittal is attached.

**12. Authorization to Charge Additional Fees**

- The Commissioner is hereby authorized to charge the following additional fees during the entire pendency of this application to Account No. 19-0079.
  - 37 C.F.R. 1.16(a), (f) or (g) (filing fees)
  - 37 C.F.R. 1.16(b), (c) and (d) (presentation of extra claims)
  - 37 C.F.R. 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)
  - 37 C.F.R. 1.17 (application processing fees)
  - 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

**13. Instructions as to Overpayment**

- Credit Account No. 19-0079
- Refund

Date: January 18, 2008  
Samuels, Gauthier & Stevens, LLP  
225 Franklin Street, Suite 3300  
Boston, MA 02110  
Telephone: (617) 426-9180, Ext. 149  
Facsimile: (617) 426-2275

Respectfully submitted,



Steven M. Mills  
Registration Number 36,610  
Attorney for Applicants



01-19-00

PATENT  
Attorney Docket No. SAM-098

A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Han Ju Yu, et al.  
Filing Date: January 18, 2000  
Title: MOVING PICTURE EXPERTS GROUP DECODING APPARATUS  
AND METHOD FOR CAPTION DISPLAY

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.10

"Express Mail" Mailing Label Number EL537136901US I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated below and is addressed to BOX PATENT APPLICATION, Assistant Commissioner for Patents, Washington, DC 20231.

1-18-00

Date

Amy Lockhart

BOX PATENT APPLICATION  
Assistant Commissioner for Patents  
Washington, DC 20231

TRANSMITTAL LETTER

Sir:

Enclosed herewith for filing in the above-identified patent application please find the following listed items:

1. New Application Transmittal;
2. New Patent Application;
3. Executed Declaration, Petition and Power of Attorney;
4. Four (4) Sheets of Formal Drawings;
5. Certified Copy of Priority Document - Korean Application No. 99-3221;
6. Check in the amount of \$690.00 to cover requisite fee;
7. Assignment Recordation Form Cover Sheet -- PTO-1595;
8. Executed Assignment;
9. Check in the amount of \$40.00 to cover assignment recordation fee; and
10. Return Postcard.

In connection with the foregoing matter, please charge any additional fees which may be due, or credit any overpayment, to Deposit Account Number 19-0079. A duplicate copy of this letter is provided for this purpose.

Respectfully submitted,

Date: January 18, 2000  
Samuels, Gauthier & Stevens, LLP  
225 Franklin Street, Suite 3300  
Boston, MA 02110  
Telephone: (617) 426-9180, Ext. 149  
Facsimile: (617) 426-2275  
K:\Samsung\098\transapp.wpd

Steven M. Mills  
Registration Number 36,610  
Attorney for Applicants

MOVING PICTURE EXPERTS GROUP DECODING APPARATUS AND METHOD FOR  
CAPTION DISPLAY

Background of the Invention

1. Field of the Invention

The present invention relates to a moving picture experts group (MPEG) decoder, and more particularly, to an MPEG decoder for caption display and a decoding method of the same.

2. Description of the Related Art

A video stream, which is decoded by an MPEG video decoder, has a structure in which a sequence header representing the start of a video sequence and a plurality of groups of pictures (GOPs) are consecutively arranged. Each GOP includes a GOP header and a plurality of pictures such as an I picture, a P picture, and a B picture.

The GOP header includes a user data area. For example, a twenty-first horizontal line in a video stream can be used as the user data area. This user data area is usually used to store caption information.

Generally, a caption function denotes a function of displaying, for example, a Korean or English-language caption on a display screen. In conventional systems, in order to perform a caption function, user data is extracted from the header information of the video stream. The extracted user data is applied as caption data to a video encoder, and generated as an internal caption signal.

FIG. 1 is a schematic block diagram of a conventional MPEG decoder. Referring to FIG. 1, the conventional MPEG decoder includes an MPEG A/V demultiplexer 100, an audio digital-to-analog converter (DAC) 110, a video decoder 120, a header first in first out (FIFO) memory 130, a central processing unit (CPU) 140, and a video mixer 150. Also, the video encoder 160 is shown in FIG. 1 for convenience of explanation.

The MPEG A/V demultiplexer 100 demultiplexes an MPEG stream applied from an input terminal MIN into a digital audio stream and a video stream. The audio decoder 105 decodes the audio stream applied from the MPEG A/V demultiplexer 100. The audio DAC 110

converts the decoded digital audio stream applied from the MPEG A/V demultiplexer 100 into an analog signal and outputs the analog signal via an audio output terminal A\_OUT.

The video decoder 120 decodes the video stream applied from the MPEG A/V demultiplexer 100 and extracts user data USER\_DATA from the GOP header of the video stream. The header FIFO memory 130 stores the user data USER\_DATA extracted from the GOP header. The CPU 140 receives the user data USER\_DATA from the header FIFO memory 130 and outputs the user data USER\_DATA as caption information if the user data is determined to be caption information. The video mixer 150 mixes a video signal decoded by the video decoder 120 with on-screen-display (OSD) data applied from an OSD controller (not shown) and outputs the result to the video encoder 160. The video encoder 160 encodes the output of the video mixer 150 and the user data USER\_DATA, that is, caption data, output from the CPU 140, and outputs the result of encoding via a video output terminal V\_OUT.

In the conventional MPEG decoder shown in FIG. 1, user data USER\_DATA extracted from the header of an MPEG video stream is directly output to the video encoder 160 in order to perform a caption function. The caption function is therefore achieved by expensive encoders or televisions which are specially manufactured to include the caption function. Thus, in the prior art, ordinary televisions cannot perform a caption function.

#### Summary of the Invention

An object of the present invention is to provide a moving picture experts group (MPEG) decoder for caption display in which caption data is output using an on-screen-display (OSD) module, thus allowing ordinary televisions to perform a caption function.

Another object of the present invention is to provide a decoding method performed in the MPEG decoder.

Accordingly, to achieve the first object, the present invention provides a moving picture experts group (MPEG) decoder for demultiplexing an external-applied MPEG stream into an audio stream and a video stream and for decoding the video stream and outputting the decoded video stream on a screen. The device includes a video decoder for decoding the video stream and extracting user data from the header information of the video stream. A header memory stores the user data. A central processing unit (CPU) produces caption data by decoding the user

data and transforms the caption data into on-screen-display (OSD) object data. An OSD controller transforms the OSD object data into pixel data in response to a predetermined enable signal and outputs the pixel data. A video mixer mixes the pixel data with the decoded video data.

To achieve the second object, the present invention provides a MPEG decoding method. An MPEG video stream is decoded, and user data is extracted from the header of the MPEG video stream. Caption data is produced by decoding the user data. The caption data is transformed into OSD object data, and the OSD object data is stored. The OSD object data is transformed into pixel data if an OSD enable signal has been applied. The pixel data is mixed with video data, and the resultant data is provided as output.

#### Brief Description of the Drawings

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

FIG. 1 is a schematic block diagram of a conventional moving picture experts group (MPEG) decoder.

FIG. 2 is a schematic block diagram of one embodiment of an MPEG decoder for caption display according to the present invention;

FIG. 3 is a detailed schematic block diagram of the on-screen-display (OSD) controller in the MPEG decoder shown in FIG. 2.

FIG. 4 is a flowchart illustrating one embodiment of an MPEG decoding method according to the invention which can be performed in the MPEG decoder shown in FIG. 2.

#### Description of Preferred Embodiments of the Invention

Referring to FIG. 2, one embodiment of a moving picture experts group (MPEG) decoder for caption display according to the present invention includes an MPEG audio/video (A/V) demultiplexer 200, an audio digital-to-analog converter (DAC) 210, an input buffer 220, a video

decoder 230, a header first in first out (FIFO) memory 260, a central processing unit (CPU) 270, an on-screen-display (OSD) controller 280, and a video mixer 250. FIG. 2 also shows a video encoder 290.

The MPEG A/V demultiplexer 200 receives an MPEG stream from an external source via an input terminal MIN and demultiplexes the received MPEG stream into a digital audio stream and a video stream. The MPEG stream can be applied from a data processor of an external device such as a compact disc player (CDP) or a digital versatile disc player (DVDP). Also, the MPEG stream is defined as a signal which can be applied to a hard disc or a compact disc when it is adapted to computers.

The audio decoder 205 decodes the audio stream applied from the MPEG A/V demultiplexer 200. The audio DAC 210 converts the decoded digital audio stream into an analog audio signal and outputs the converted analog audio signal via an audio output terminal A\_OUT. The input buffer 220 buffers the video stream and outputs the buffered video stream to the video decoder 230. The video decoder 230 decodes the video stream buffered by the input buffer 220 and outputs the decoded result to the video mixer 250.

The video decoder 230 includes an MPEG stream decoder 232, an inverse quantizer 234, an inverse discrete cosine transformer (IDCT) 236, a frame memory 237, a motion compensator 238, and an adder 239. The video decoder 230 decodes, inversely quantizes, and inversely discrete cosine transforms (IDCT) the video bit stream, compensates for the motion of the video bit stream, and outputs the result to the video mixer 250. Also, the video decoder 230 extracts user data USER\_DATA from the group of picture (GOP) header information of the video bit stream.

The header FIFO memory 260 stores the user data USER\_DATA extracted by the video decoder 230. The CPU 270 decodes the user data USER\_DATA output from the header FIFO memory 260 and produces caption data. The caption data is transformed into OSD object data OSD\_OBJ and is stored in the OSD buffer 282 of the OSD controller 280. Here, the OSD object data is defined as data including information on the positions, sizes and colors of OSD characters to be displayed on a screen.

Also, the CPU 270 produces an OSD enable signal OSD\_EN (not shown) for displaying caption data on a screen. Here, the OSD enable signal OSD\_EN may use the start bit of the

OSD object data OSD\_OBJ, or a special enable signal may be produced and output to the OSD processor 284. The CPU 270 can be a reduced instruction set computer (RISC) processor.

The OSD controller 280 includes an OSD buffer 282 and an OSD processor 284. The OSD controller 280 transforms the OSD object data OSD\_OBJ output from the CPU 270 into pixel data in response to the OSD enable signal OSD\_EN and outputs the pixel data to the video mixer 250. The video mixer 250 mixes a video signal decoded by the video decoder 230 with the pixel data output from the OSD controller 280. The video encoder 230 encodes the data output from the video mixer 250 and outputs the encoded data via a video output terminal V\_OUT. An audio signal output via the audio output terminal A\_OUT and a video signal output via the video output terminal V\_OUT are reproduced on a television monitor.

More specifically, in the video decoder 230 of the MPEG decoder shown in FIG. 2, the MPEG stream decoder 232 decodes a video stream received from the input buffer 220 and outputs a DCT coefficient DCT\_CO and motion information MOT\_INF. The motion information MOT\_INF is information which can include a motion vector value for compensating for the motion of a video signal. The DCT coefficient DCT\_CO is inversely quantized by the inverse quantizer 234, and the inversely-quantized result is IDC transformed by the IDCT 236.

The motion compensator 238 compensates for the motion between a present picture and a past picture which is stored in the frame memory 237, using the motion information MOT\_INF vector output from the MPEG stream decoder 232. The adder 239 adds the compensated result of the motion compensator 238 to the output of the IDCT 236 and produces a decoded video signal. The video signal output from the adder 239 is stored as a past picture in the frame memory 237. It is used to compensate for the motion of a picture which is applied later.

As described above, the MPEG decoder shown in FIG. 2 extracts user data from the GOP header of an MPEG stream and decodes the user data. The decoded caption data is transformed into OSD data, and the OSD data is output via the OSD controller 280, such that a caption function is performed.

FIG. 3 illustrates an embodiment of the OSD controller 280 shown in FIG. 2. Referring to FIG. 3, the OSD controller 280 includes an OSD buffer 282 and an OSD processor 284. The OSD buffer 282 is usually installed in a memory such as a dynamic random access memory (DRAM). The OSD buffer 282 stores the OSD object data OSD\_OBJ received from the CPU

270. The OSD object data OSD\_OBJ can be considered as data transformed by caption information when a caption function is performed. However, when an ordinary function is performed, the OSD object data is considered as data for displaying ordinary OSD characters.

The OSD processor 284 reads the OSD object data from the OSD buffer 282, and transforms the OSD object data into pixel data. The OSD processor 284 includes a buffer interface unit 32, a text OSD (T OSD) module 34, a bit map OSD (B OSD) module 36, a text color loop-up table (T CLUT) 35, a bit map color loop-up table (B CLUT) 39, and an OSD mixer 37. The OSD processor 300 can be configured using one of T OSD module 34 and B OSD module 36. In this case, OSD mixer 37 is not used, but one look-up table of T CLUT 35 and B CLUT 39 is used. The buffer interface unit 32 in the OSD processor 284 receives the OSD object data OSD\_OBJ from the OSD buffer 282 and transmits the same to the internal block of the OSD processor 284.

The T OSD module 34, for displaying text information, receives the OSD object data OSD DATA as text OSD information and transforms the text OSD information as pixel data. Also, the T OSD module 34 includes a font look-up table for loading a bit map font. The B OSD module 36 receives the OSD object data OSD DATA as bit map OSD information and transforms the bit map OSD information as pixel data.

The T CLUT 35 stores color information for outputting text OSD information, and B CLUT 39 stores color information for outputting bit map OSD information. The OSD mixer 37 receives text pixel data from the T OSD module 34 and bit map pixel data from the B OSD module 36, mixes them, and outputs the result of mixing to the video mixer 250 via an output terminal OSD OUT. As described above, the OSD object data OSD\_OBJ transformed from caption data is transformed into pixel data by the T OSD module 34.

FIG. 4 is a flowchart illustrating one embodiment of an MPEG decoding method for caption display according to the present invention. The MPEG decoding method includes steps 400 and 410 of decoding an MPEG video stream and of extracting user data from the header of the MPEG video stream, steps 420 and 430 of producing caption data by decoding the user data and of transforming the caption data into OSD object data, and steps 440, 460 and 470 of determining whether an OSD enable signal has been applied, of transforming the OSD data into

pixel data if the OSD enable signal has been applied, and of mixing the pixel data with video data and outputting the result.

The method of FIG. 4 will now be described in detail. The video decoder 230 of the MPEG decoder decodes an MPEG video stream in step 400. In this step, the MPEG stream decoder 232 decodes the MPEG video bit stream and produces a DCT coefficient DCT\_CO and motion information MOT\_INF. The DCT coefficient undergoes inverse quantization and IDCT processes. The resultant coefficient is added to motion-compensated video data, and the added result is applied to the video mixer 250. After the MPEG bit stream is decoded in step 400, the MPEG stream decoder 232 extracts user data USER\_DATA from the header of the bit stream in step 410. Then, the user data USER\_DATA is transmitted to the CPU 270 via the header FIFO memory 260. The CPU 270 decodes the user data USER\_DATA and produces caption data in step 420.

In step 430, the CPU 270 transforms the received caption data into OSD object data OSD\_OBJ and stores the OSD object data OSD\_OBJ in the OSD buffer 282. Then, in step 440, a determination is made as to whether an OSD enable signal OSD\_EN for displaying OSD data has been applied from the CPU 270.

If it is determined in step 440 that the OSD enable signal OSD\_EN has been applied, the OSD processor 284 reads OSD object data from the OSD buffer 282 and transforms the OSD object data into pixel data, in step 460. That is, the T OSD module 34 in the OSD processor 284 obtains pixel data corresponding to the OSD object data OSD\_OBJ stored in the OSD buffer 282. On the other hand, if it is determined in step 440 that the OSD enable signal OSD\_EN has not been applied, the operation of the MPEG decoder remains in a waiting condition in step 440.

When the OSD object data is transformed into pixel data in step 460, the OSD processor 284 outputs the pixel data to the video mixer 250. The video mixer 250 mixes the video data decoded by the MPEG video decoder 236 with the pixel data, in step 470. The output data of the video mixer 250 is encoded by the video encoder 290 and can be displayed on a television screen. Accordingly, conventional televisions can also perform a caption function by decoding an MPEG stream through the above-described processes.

According to the present invention, caption data is produced by extracting user information from the header of an MPEG video stream and decoding the user information, and the caption data is transformed into OSD data using OSD modules, so that ordinary televisions can perform a caption function. Also, the MPEG decoding method for caption display according

to the present invention can be applied to various systems adopting an MPEG decoder, so that a low-priced system having a caption function can be realized.

While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the following claims.

What is claimed is:

## CLAIMS

1. 1. A moving picture experts group (MPEG) decoder for producing a caption for display on  
2 a screen, said decoder producing a video stream from an externally-applied MPEG  
3 stream, the decoder comprising:
  - 4 a video decoder for decoding the video stream and extracting user data from  
5 header information of the video stream;
  - 6 a header memory for storing the user data;
  - 7 a central processing unit (CPU) for (i) producing caption data by decoding the  
8 user data and (ii) transforming the caption data into on-screen-display (OSD) object data;
  - 9 an OSD controller for transforming the OSD object data into pixel data in  
10 response to a predetermined enable signal and outputting the pixel data; and  
11 a video mixer for mixing the pixel data with the decoded video data.
1. 2. The MPEG decoder of claim 1, wherein the OSD controller comprises:
  - 2 an OSD buffer for storing the OSD object data received from the CPU; and
  - 3 an OSD processor for reading the OSD object data from the OSD buffer and  
4 transforming the OSD object data into pixel data.
1. 3. The MPEG decoder of claim 1, wherein the OSD object data is considered data  
2 transformed from caption information when a caption function is performed, and  
3 considered data for displaying ordinary OSD characters when an ordinary function is  
4 performed.
1. 4. An MPEG decoding method comprising the steps of:
  - 2 (a) decoding an MPEG video stream;
  - 3 (b) extracting user data from the header of the MPEG video stream;
  - 4 (c) producing caption data by decoding the user data;
  - 5 (d) transforming the caption data into OSD object data and storing the OSD  
6 object data;
  - 7 (e) determining whether an OSD enable signal has been applied;

- 8                             (f) transforming the OSD object data into pixel data if the OSD enable signal has  
9                             been applied; and  
10                           (g) mixing the pixel data with video data and outputting the resultant data.

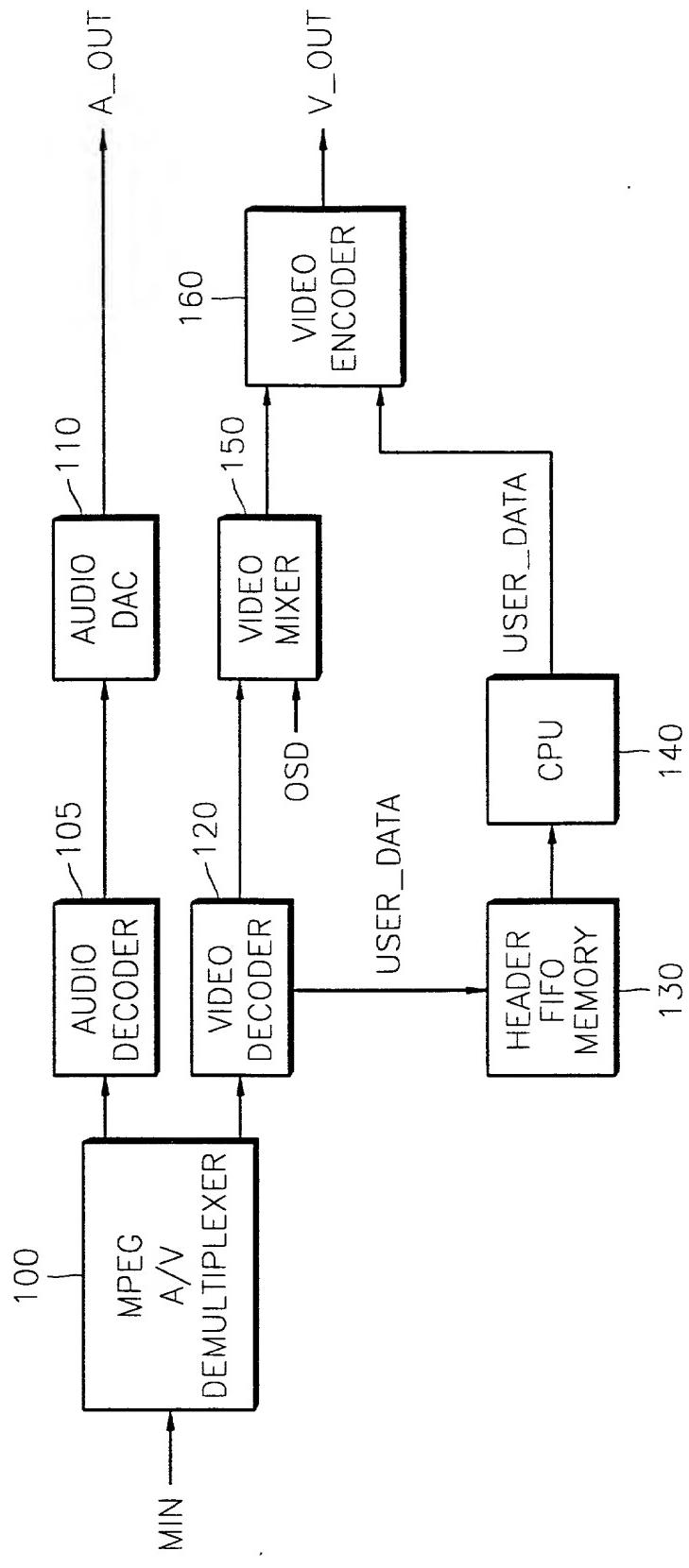
MOVING PICTURE EXPERTS GROUP DECODING APPARATUS AND METHOD FOR  
CAPTION DISPLAY

Abstract of the Disclosure

An MPEG decoder for caption display, and a decoding method for caption display are  
5 provided. The MPEG decoder demultiplexes an external-applied MPEG stream into an audio  
stream and a video stream and decodes the video stream and outputs the decoded video stream  
on a screen. The decoder includes a video decoder for decoding the video stream and extracting  
user data from the header information of the video stream. A header memory stores the user  
data. A central processing unit (CPU) produces caption data by decoding the user data and  
10 transforming the caption data into on-screen-display (OSD) object data. An OSD controller for  
transforms the OSD object data into pixel data in response to a predetermined enable signal and  
outputs the pixel data. A video mixer mixes the pixel data with the decoded video data. In this  
way, caption data is produced by extracting user information from the header of an MPEG video  
stream and decoding the user information. The caption data is transformed into OSD data using  
15 OSD modules, so that ordinary televisions can perform a caption function.

K:\Samsung\098\098patapp2.wpd

FIG. 1 (PRIOR ART)



**FIG. 2**

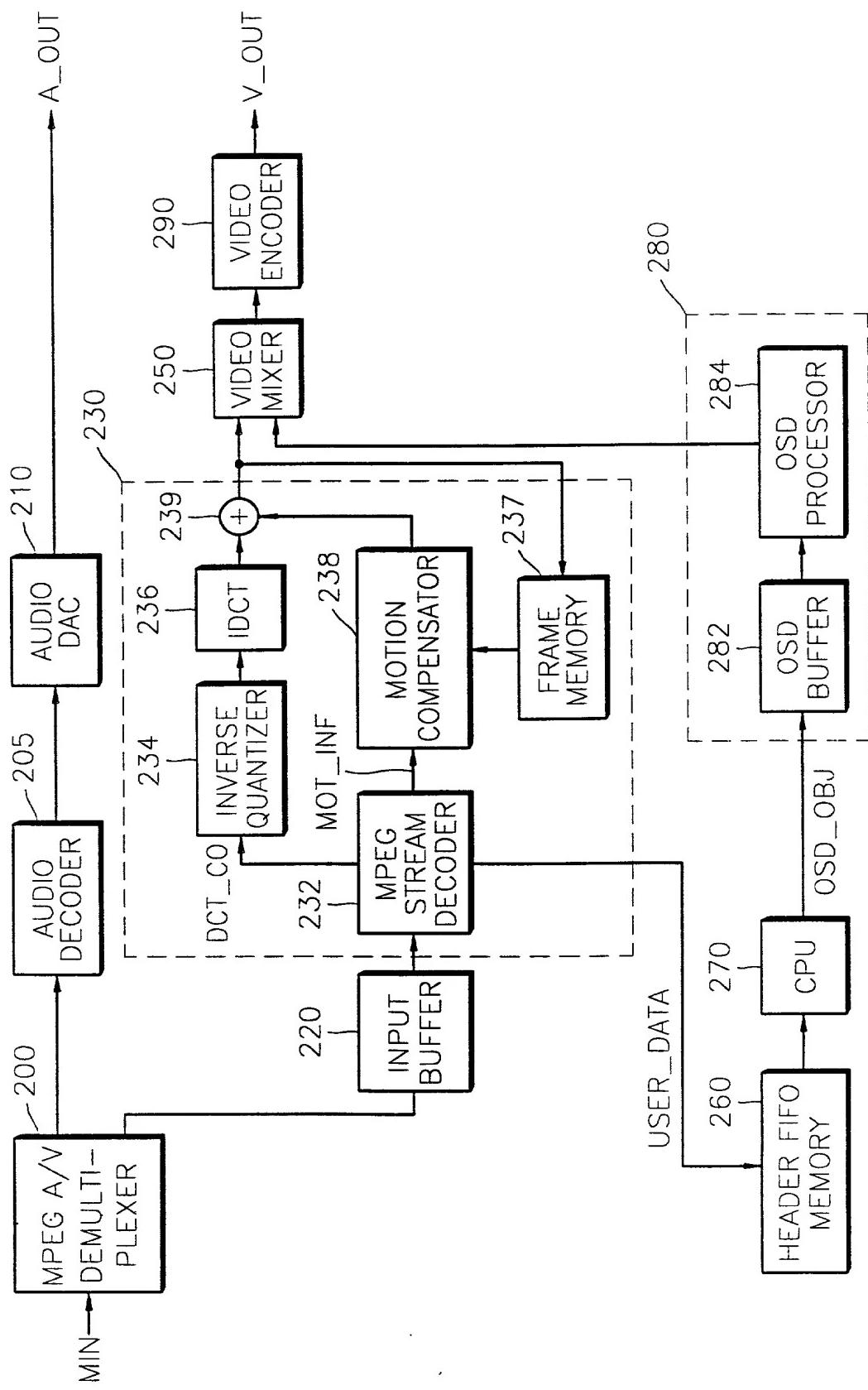


FIG. 3

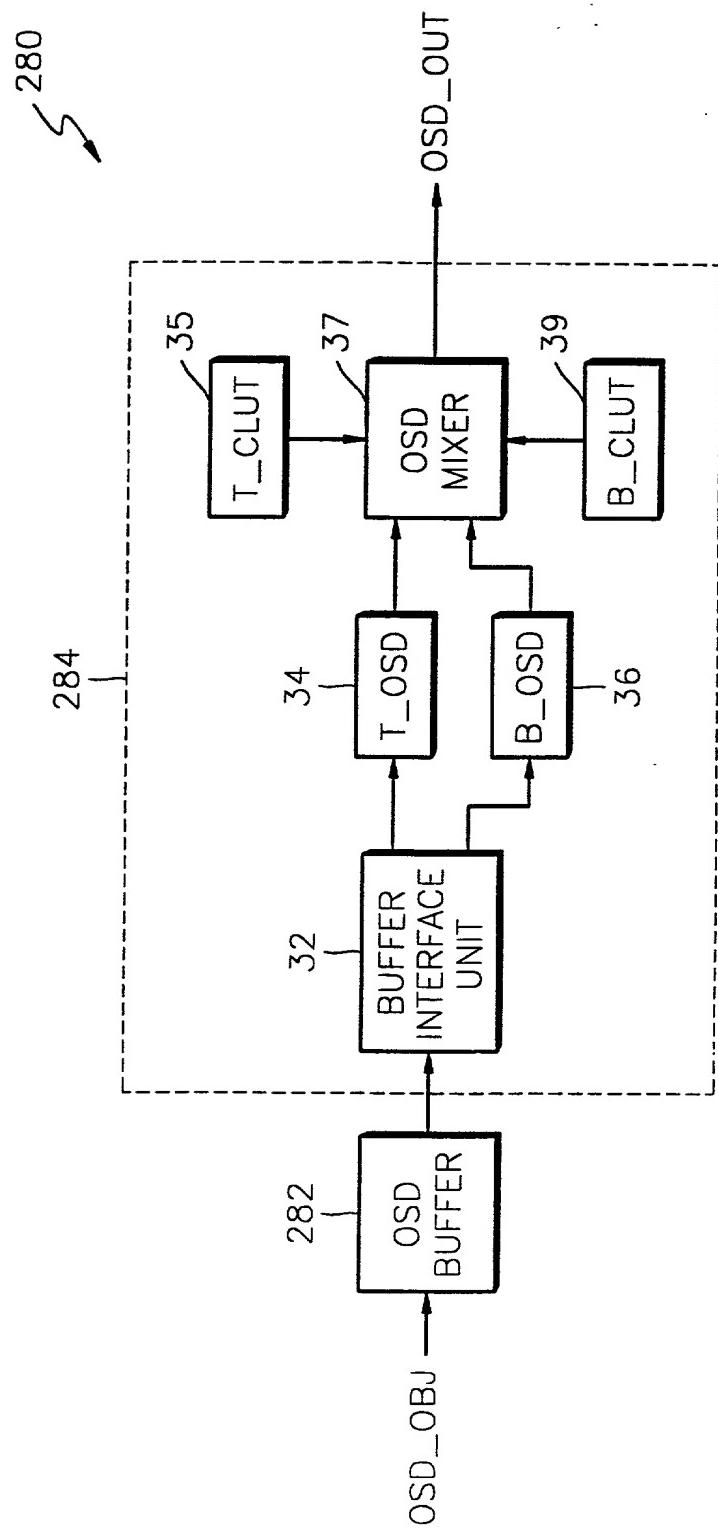
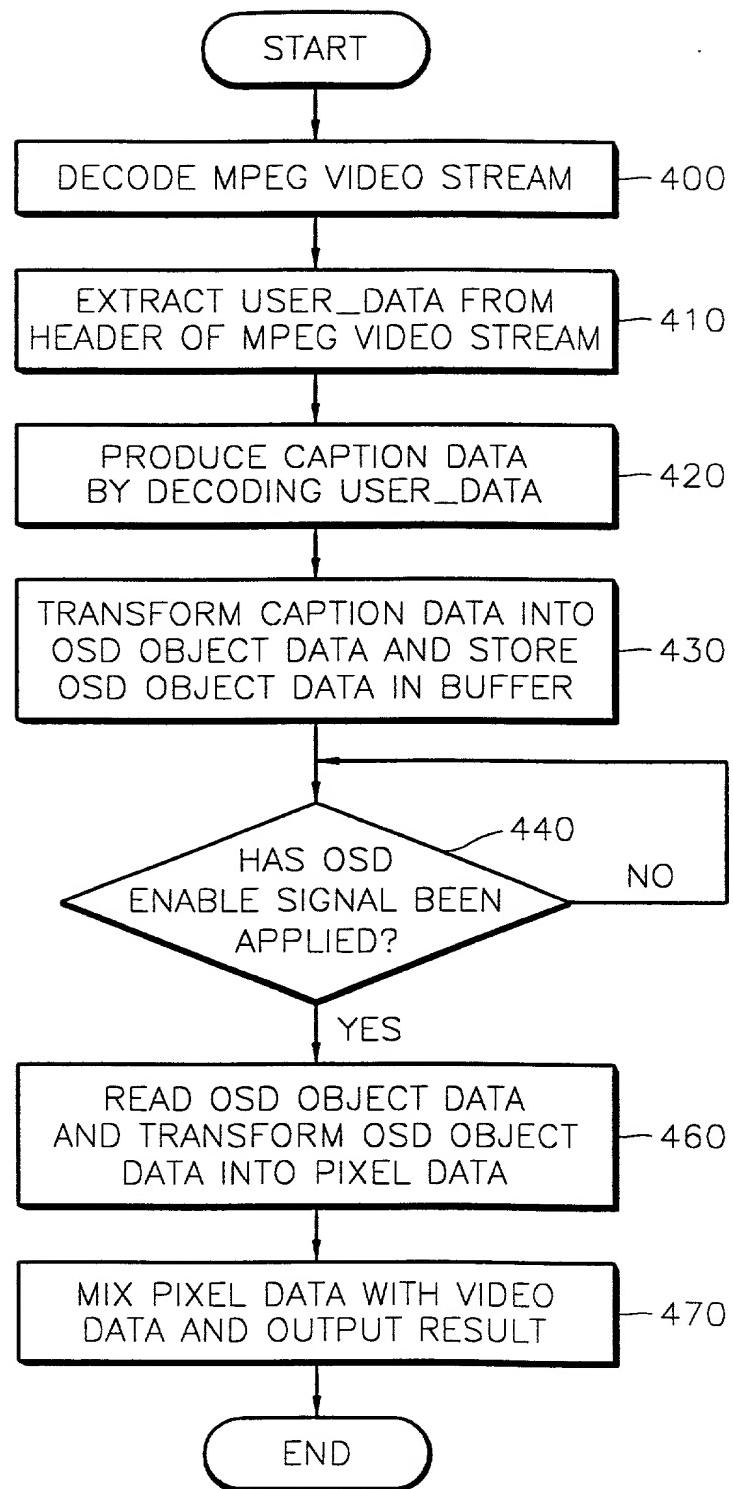


FIG. 4



<b>*DECLARATION, PETITION AND POWER OF ATTORNEY FOR PATENT APPLICATION</b>	Attorney Docket No: <b>SAMJ-098</b>

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**MOVING PICTURE EXPERTS GROUP DECODING APPARATUS AND METHOD  
FOR CAPTION DISPLAY**

the specification of which (check only one):

is attached hereto.

was filed as United States Patent Application

Serial No. \_\_\_\_\_

on \_\_\_\_\_

and was amended

on \_\_\_\_\_

(if applicable)

was filed as PCT Patent Application

Serial No. \_\_\_\_\_

on \_\_\_\_\_

and was amended under PCT Article 19

on \_\_\_\_\_

(if applicable)

I hereby state that I have reviewed and understand the contents of the specification, including the claims as amended by any amendment referred to herein.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

**PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119:**

COUNTRY (if PCT indicate PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. § 119 (YES/NO)
Republic of Korea	99-3221	1 February 1999	YES

DECLARATION, PETITION AND POWER OF ATTORNEY FOR PATENT APPLICATION

Attorney Docket No:  
**SAMJ-098**

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below.

**PRIOR U.S. APPLICATIONS FOR BENEFIT UNDER 35 U.S.C. § 119(e):**

APPLICATION NUMBER	FILING DATE

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56 which occurred between the filing date of the prior applications and the national or PCT international filing date of this application:

**PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATION(S) DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. § 120:**

APPLICATION NUMBER (if PCT indicate PCT)	DATE OF FILING (day, month, year)	STATUS: (PATENTED, PENDING OR ABANDONED)

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Maurice E. Gauthier	Reg. No. 20,798	Patrick J. O'Shea	Reg. No. 35,305
Richard L. Stevens	Reg. No. 24,445	Arlene J. Powers	Reg. No. 35,985
Matthew E. Connors	Reg. No. 33,298	Steven M. Mills	Reg. No. 36,610
William E. Hilton	Reg. No. 35,192	Anthony P. Onello, Jr.	Reg. No. 38,572

**Send Correspondence to:**

Steven M. Mills, Esq.  
Samuels, Gauthier & Stevens LLP  
225 Franklin Street  
Boston, Massachusetts 02110

**Direct Telephone Calls to:**

Steven M. Mills, Esq.  
(617) 426-9180 Ext. 149  
(617) 426-2275 (facsimile)

Wherefore I petition that letters patent be granted to me for the invention or discovery described and claimed in the attached specification and claims, and hereby subscribe my name to said specification and claims and to the foregoing declaration, power of attorney, and this petition.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signature  Date *January 6, 2006*

Full Name of 1st Inventor	Family Name <b>Yu</b>	First Given Name <b>Han Ju</b>	Second Given Name
Residence & Citizenship	City <b>Chungcheongnam-do</b>	State or Foreign Country <b>Republic of Korea</b>	Country of Citizenship <b>Republic of Korea</b>
Post Office Address	Post Office Address <b>814, Kumsung Apt., Kumsung-myeon, Kumsan-gun</b>	City <b>Chungcheongnam-do</b>	State & Zip Code/Country <b>Republic of Korea</b>

DECLARATION, PETITION AND POWER OF ATTORNEY FOR PATENT  
APPLICATION

Attorney Docket No:  
**SAMJ-098**

Signature		Date	
<i>Don-hee Jung</i>		<i>January 10, 2000</i>	
Full Name of 2 <sup>nd</sup> Inventor	Family Name <b>Jung</b>	First Given Name <b>Don-he</b>	Second Given Name
Residence & Citizenship	City <b>Seoul</b>	State or Foreign Country <b>Republic of Korea</b>	Country of Citizenship <b>Republic of Korea</b>
Post Office Address	Post Office Address <b>87-405, Banpo Apt., Banpobon-dong, Seocho-gu</b>	City <b>Seoul</b>	State & Zip Code/Country <b>Republic of Korea</b>
Signature		Date	
<i>Hyuk-jong Wang</i>		<i>January 6, 2000</i>	
Full Name of 3 <sup>rd</sup> Inventor	Family Name <b>Wang</b>	First Given Name <b>Hyuk-jong</b>	Second Given Name
Residence & Citizenship	City <b>Seoul</b>	State or Foreign Country <b>Republic of Korea</b>	Country of Citizenship <b>Republic of Korea</b>
Post Office Address	Post Office Address <b>105, 1643-18, Seocho 1-dong, Seocho-gu</b>	City <b>Seoul</b>	State & Zip Code/Country <b>Republic of Korea</b>